April 1, 1975

SUMMARY OF PESTICIDE SAFETY STUDIES CONDUCTED IN IMPERIAL COUNTY, CALIFORNIA DURING JANUARY AND FEBRUARY 1975

Keith T. Maddy, Staff Toxicologist
Agricultural Chemicals and Feed
California Department of Food and Agriculture
Sacramento, California

This is to briefly summarize studies on pesticide safety conducted in Imperial County, California, during January and February, 1975.

The Division of Inspection Services of the California Department of Food and Agriculture undertook a study on pesticide safety practices in Imperial County in January and February, 1975. The Department set up and operated three laboratory facilities within the county, (a) one mobile laboratory to analyze crops at harvest time for pesticide residues (for possible hazards to the consumer), (b) one mobile laboratory to analyze samples of crops that workers would handle for residues that they might contact at harvest time, and (c) an automated clinitron blood testing facility set up at the Pioneer Memorial Hospital in Brawley to analyze with a colorometric procedure for plasma and red cell cholinesterase enzyme levels of persons who might be exposed to pesticides or their residues.

In December, prior to the inception of the field study, the Division's Pesticide Product Quality Program had collected samples of seven different brands of pesticides containing phosdrin that were then being used on crops in the county. Analysis was accomplished in the Division's laboratory in Sacramento. The brands tested included: Shell, Niagara, Prokil, Dot-Son, Coastox, Helena, Durham. None of the products were found to be overformulated or deficient upon analysis.

There was a fine spirit of cooperation particularly on the part of members of (a) the Agricultural Commissioner's Staff, (b) the Imperial County Health Department, (c) the Pioneer Memorial Hospital in Brawley, (d) the Farm Worker's Clinic in Brawley, (e) the licensed pest control operators of the area, and (f) the Teamsters Union, with the staff members of the California Department of Food and Agriculture. A special effort was also made to work through the medical clinic of the United Farm Workers, but this was not accomplished. The State Department of Health was also helpful in making arrangements for this study.

During the last ten days of the Department's study, the University of California at Davis sent a team to study pesticides in use in fields that harvest workers might contact. They also conducted detailed health examinations and blood studies on one crew of field harvesters. The Department's laboratory also tested blood samples collected by the University team for cholinesterase values.

Scientists of the National Institute of Occupational Safety and Health's Agricultural Safety Team from their University of Utah facility and

scientists from the Washington, D. C., office of the Stanford Research Institute spent several days observing various aspects of this field study.

At all times, at least one toxicologist from the Department was on site in charge of the various studies; at least one agricultural inspector was always available to collect field samples and at least one chemist was available to operate each laboratory facility. This sometimes necessitated work at night, on weekends, and through holidays.

Numerous samples of various field crops were collected at harvest time that included lettuce, carrots, broccoli, and asparagus. None of these crops were found to have pesticide residues above legal tolerance levels. Special efforts were concentrated on sampling after several cold days when the possibility of slow pesticide decay was the greatest. In this regard especially detailed studies were made of phosdrin activity when applied by air to head lettuce for meeting tolerance requirements. Field sampling of whole heads treated with a variety of brands of phosdrin under weather conditions as cold as a 23° F. minimum temperature at night at ground level for application levels from one pint to one quart per acre of liquid phosdrin pesticide guaranteed at four pounds of mevinphos per gallon did not reveal over-tolerance crops at the two-day preharvest interval for the pint per acre applications and the four-day preharvest interval for the quart per acre applications.

Similarly, detailed studies were conducted on the carbamate pesticide Lannate which contains the toxic ingredient methomyl. These lettuce heads were not found over-tolerance at the expiration of the preharvest interval.

Quite detailed studies were conducted on the levels of dislodgeable residues of phosdrin that workers might contact as they handled the outer leaves of lettuce at harvest time. Beginning less than one-half hour after application, samples were collected from outer leaves of head lettuce that workers would handle during the harvest operation. Several fields were studied that had been treated with several different brands of phosdrin with dosage rates from as low as one pint per acre to as much as a quart per acre. Some mornings the ground temperature was as low as 23° F. Within 24 hours after application of one pint per acre, and within 48 hours of one quart per acre, the dislodgeable residue of the Alpha isomer of phosdrin had decayed to 2 ppm, a quite safe level for workers to handle.

Similarly detailed studies were conducted on Lannate-treated crops. Within two days after the application of the Lannate, the outer leaves of the lettuce were quite safe to handle even though quite cool weather had prevailed during some of the testing period.

Blood samples were collected from: (a) field workers who had been harvesting lettuce for seven weeks, (b) lettuce inspectors who had been handling lettuce for seven weeks, (c) agricultural commissioner staff personnel who have minimal contact with pesticides, (d) patients who went to the Farm Workers Clinic in Brawley because they were ill, (e) patients who went to the Teamster's Medical Clinic for various reasons (blood collected by clinic was assayed and reported to clinic on request

of clinic personnel — almost all of these were male food-crop harvest workers) (f) persons who went to the County Health Department to have blood drawn for the usual tests prior to marriage, and (g) persons who were working as mixers, loaders, and applicators of pesticides and who were coming in for routine blood tests at the laboratory of the Pioneer Memorial Hospital.

Except for the mixers, loaders, and applicators, all human blood sample cholinesterase values appeared to fall within normal population ranges. The work of mixers, loaders, and applicators is known to entail certain hazards. For this reason, Department regulations require medical supervision of these persons when certain pesticides are in use.

A study of the medical supervision program of the pest control operators in the county was conducted and this will be summarized later. It appears that a more formal arrangement to designate repeat blood test intervals of mixers, loaders, and applicators is needed between physicians and pest control operators.

A detailed study was conducted of the complete spray history and work practices of 20 lettuce fields. No evidence of too-early entry of fields was found.

A sizable number of cattle blood samples were collected and analyzed for cholinesterase values to set normal population baselines. These cattle had been fed in feedlots in the area for the previous 90 days on dry feed with no known excess pesticide residues contained.

It appears that Imperial County has a quite active and effective pesticide safety program. No evidence was found that crops were being harvested or shipped that contained excess pesticide residues. It appeared that field workers were not being exposed to excess pesticide residues. Technical details of the several studies conducted will be analyzed, summarized, and released in a few months.

The Department will work with the State Department of Health in bringing about further improvements in the medical supervision of mixers, loaders, and applicators in the county.

Attachment No. 1

SURVEY OF MEDICAL SUPERVISION PROGRAMS

PEST CONTROL OPERATOR_____

ADDRESS_____

TELEPHONE NUMBER_____

NUMBER OF EMPLOYEES: HEIGHT OF SEASON_____OFF-SEASON_____

1. Would you explain to us the medical supervision program that you have arranged with a local physician:

2. Do you have a letter from the physician outlining your medical supervision program? Do you have some evidence that you can show me which indicates a program has been established:

   1 ____ A letter was available describing the program

   2 ____ Operator says a medical supervision program has been established, but no letter describing any doctor's recommendations was available

   3 ____ No evidence of a program was available

3. Who is your medical supervisor?

NAME_____

ADDRESS_____

TELEPHONE NUMBER_____

4. How often does your medical supervisor require your employees to be blood tested?

   ____ Once a month

   ____ Twice a month

   ____ Three times a month

   ____ Weekly

5. How frequently are the following tested:

   a) mixer-loader (tanker)_____
   b) pilots_____
   c) flaggers_____

6. Does your physician require a blood test for all new employees prior to exposure in order to establish a baseline?

   YES_____

   NO_____

7. Does your physician recommend that a new baseline be established each year during the off-season?

   YES_____

   NO_____

8. Do you keep an individual file or record on each employee?

   YES_____

   NO_____

9. Do you keep records of recommendations that your medical supervisor has made regarding a particular employee?

   YES_____

   NO_____

   (Indicate that records of recommendations from their medical supervisor should be kept for one year and are subject to audit by the Department of Health and the Department of Food and Agriculture)

10. Does your medical supervisor send you a duplicate copy of blood test results?

    YES_____

    NO_____

    Do you keep these on file?

    YES_____

    NO_____

11. NAME OF EMPLOYEES:

RESULTS OF A SURVEY OF THE MEDICAL SUPERVISION PROGRAM OF LICENSED PEST CONTROL OPERATORS IN PESTICIDE APPLICATOR WORKER SAFETY PROGRAMS

IMPERIAL COUNTY
JANUARY 1975

1.	Number of Licensed Pest Control Operators (PCOs) who had a letter from a physician describing a medical supervision program.	3	(1)
2.	Number of PCOs stating that a medical supervision program has been established but had no letter or document describing the recommendations of the medical supervisor.	6	(2)
3.	Number of PCOs having no evidence of a program.	3	
4.	Number of PCOs having employees blood tested for cholinesterase enzyme levels at the discretion of the employer.	4	
5.	Number of aerial applicators having employees blood tested according to instructions of the medical supervisor.	8	
6.	Number of PCOs blood testing at the following frequency:		
	(a) 1/week	2	(5) (6)
	(b) 1/month	4	
	(c) 2/month	4	(3) (4)
	(d) 3/month	0	
	(e) 1/year	1	
	(f) 3/year	1	
7.	Number of PCOs required by their medical supervisors to establish employees cholinesterase baselines prior to exposure.	7	
8.	Number of PCOs required by their medical supervisor to establish cholinesterase baselines on one blood test.	6	
9.	Number of PCOs required by their physician to establish a cholinesterase baseline based on two blood tests.	1	
10.	Number of PCOs filing individual cholinesterase blood test results.	10	
11.	Number of PCOs filing records of physician individual recommendations.	6	

(a) Two PCOs stated the letters from their physicians outlining their medical supervision programs were located in their offices at their homes (I did not see these two letters).

(b) One PCO stated he established his own medical supervision program.

(c) One PCO had his flaggers and the mixer-loaders blood tested every 1 or 2 weeks. The pilots were tested once a month. (This was during the busy season.)

(d) One PCO had the mixer-loaders tested twice a month. The flaggers and pilots were tested once a month.

(e) One applicator stated that his pilots would refuse to be tested more often than twice a month.

(f) One applicator had his employees blood tested weekly during the busy season and monthly during the off-season.

exposed to organophosphates and carbamates in toxicity categories one and two for more than twelve hours during every 24-hour period for several consecutive weeks.

A draft of a suggested pattern letter for a physician to write is attached.

FORM LETTER FOR MEDICAL SUPERVISOR
TO SEND TO PESTICIDE USER
FOR WHOM MEDICAL SUPERVISION IS REQUIRED

Dear Mr. _____

This is in response to your request that I provide medical supervision to any of your employees requiring such care, according to Article 23 of Title 3, Agriculture, Chapter 4, Plant Industry, Subchapter 1, Chemistry, Group 2, Economic Poisons, of the California Administrative Code.

I expect your firm to abide by the provisions of this Article and I intend to provide medical supervision in accordance with the guidelines provided by the California State Department of Health as specified by Section 2477 (d) of this Article.

If you intend to allow an employee to work as a mixer, loader, applicator, or flagger with a pesticide with the signal word "DANGER" or "WARNING" on the label that contains an organophosphate or a carbamate for more than one hour each in eight half-day periods in a 30-day period, it shall be your responsibility to have that employee come to me for an examination and at least two blood tests at least three days apart in order to set a cholinesterase baseline before such exposure begins. If an employee has had any exposure to such pesticides, further exposures shall be avoided for 30 days before the baseline testing period begins. Required minimum test intervals are as follows:

A. When any pesticide with the signal word "DANGER" on the label containing organophosphates (for example, phosdrin, parathion, methyl parathion, TEPP, Guthion, Thimet, Torak, Systox, DiSyston) or carbamates (for example, Temik, Lannate, Nudrin, Furadan, or Carzol) is used by an employee who mixes or loads these pesticides without a closed mixing and without a closed loading system for more than one hour per day during three or more days in a seven-day period, that employee shall be required by you to come to my office or to a designated laboratory for the drawing of a blood sample during or at the end of that seven-day period.

B. When the above described types of pesticides are used less frequently than one hour per day during three days in a seven-day period, but any pesticide containing an organophosphate or a carbamate that carries the signal word "DANGER" or "WARNING" is used for more than one hour per day during eight half-day work periods during a 30-day work period, any mixer, loader, applicator, or flagger so exposed shall be required by you to come in for a blood test at least once during that 30-day period.

C. When the above described pesticides are used less than one hour per day during eight half-day work periods in a 30-day period, blood sampling does not need to be routinely scheduled.

I shall schedule more frequent tests and shall designate nonexposure periods as necessary according to the test results. When work experience demonstrates little effect on cholinesterase values, I may schedule less frequent testing. With mutual cooperation we should be able to assure your employees a reasonably safe work situation.

Sincerely

_____, M.D.

April 1, 1975

EVALUATION OF THE MEDICAL SUPERVISION SURVEY CONDUCTED IN IMPERIAL COUNTY IN JANUARY 1974

Keith T. Maddy, Staff Toxicologist,
Charles Kahn, Agricultural Inspector, and
Lori Peterson, Agricultural Inspector
Agricultural Chemicals and Feed
California Department of Food and Agriculture

It appears that Imperial County has one of the best pesticide safety programs in the State. One area of the program that had not been given close scrutiny because of the concern about interfering with aspects of the practice of medicine was the status of the medical supervision. This area of the pesticide safety program is also a responsibility of the State Department of Health.

In order to evaluate the existing medical supervision programs, we developed a questionnaire (see form, Attachment #1) and conducted a survey of the major licensed Pest Control Operators (PCOs) working in Imperial County in cooperation with the Imperial County Agricultural Commissioner's Office. This included visits to PCOs located in Yuma, Arizona, that apply pesticides in Winterhaven which is located near the California-Arizona border.

Objectives of the survey:

1. To determine if medical supervision is available for persons at risk and if it is being utilized.

2. To determine if the employer is aware of his responsibilities outlined in the Worker Safety Regulations, Section 2477, Title 3.

3. To make recommendations that would improve communications between employers and physicians that would in turn expedite compliance with the regulations.

During the last two weeks of January, twelve PCOs were contacted. The number of employees hired by the twelve applicators varied from four to about forty employees.

We found that only three PCOs actually had a letter on file describing their medical supervision program. Six applicators said a program had been established, but no evidence was available. Three applicators said a specific program had not been established. All applicators that had men at risk were requiring some blood tests, however, the frequency of blood testing varied considerably from one test a week to one test a year (see chart, Attachment #2, tabulation of survey findings). Six aerial applicators stated that they had a medical supervisor, although no letter describing the doctor's recommendations was available. When asked how frequently their employees were tested, the employer's description of his testing schedule led us to believe that the frequency of testing was usually at the employer's discretion and not directed by a physician's

instructions. From the nature of their questions and their reactions to questions, we concluded that when the employers stated that a program had been established but no evidence was available; in fact these employers had not contacted "their doctor" actively seeking establishment of a medical supervision program. The employer's questions indicated that the majority of employers lacked a clear understanding of the employer's responsibilities in providing a medical supervision program.

CONCLUSIONS

1. Employers often lacked satisfactory evidence that a medical supervision program had been established.

2. Employers were often not keeping good records of the physician's recommendations.

3. Some employers were not aware that records of physician's recommendations for 12 months would be subject to audit.

4. The management of the smaller firms seemed to think that the expense of frequent blood testing was too high.

5. Overall, the larger companies appeared to have more comprehensive safety programs than smaller companies. Larger firms shared the opinion that if they invest in a quality safety program, they will save money in the long run by decreasing the number of workmen's compensation claims and work time lost by the employees.

RECOMMENDATIONS

The majority of PCOs did not have a letter on file verifying that a medical supervision program had been established. Without a letter explaining the medical supervision program, the employer has no guideline to follow specifying frequency of blood testing, etc.; and no evidence or proof that a program has actually been established. In order to improve communications between the physician and the employer, a suggested form letter should be supplied to the physician by the State. The form letter should briefly state that the physician has agreed to provide medical supervision for employees who are exposed to certain organophosphates and carbamate pesticides for various time intervals. The form letter would indicate that regular blood testing is required at a suggested test interval schedule according to the pesticides that the firm expects to use that year.

Many of the smaller companies complained of the expense of blood testing. Most employers do not wish to pay more for medical supervision per employee than their competitors pay. It seems that some employers seek medical supervision from a physician that requires the least number of blood tests.

In order to insure adequate medical supervision during the height of the season, the physician's guidelines to the employer should require a minimum number of tests during specified time periods, for it is not unusual in Imperial County and some other parts of California during the height of the pesticide application season for some employees to be

PESTICIDE APPLICATION AND HARVEST HISTORY OF TWENTY LETTUCE FIELDS IN IMPERIAL COUNTY, CALIFORNIA January and February 1975

Charles Kahn, Agricultural Inspector
Agricultural Chemicals and Feed
California Department of Food and Agriculture

During the last two weeks in February 1975, a survey was made of twenty recently harvested lettuce fields selected at random in Imperial County, California. Miguel Monry, an Agricultural Inspector of the Imperial County Agricultural Commissioner's Office and I conducted this survey. The survey was made to ensure that all applicable worker reentry safety intervals were being observed and that all preharvest intervals were being complied with. The fields investigated varied from twenty (20) to eighty (80) acres in size.

This survey was conducted as follows:

1. Imperial Valley Pesticide Use Reports were examined and a chronological history recorded of the pesticides applied to each field during a thirty (30) day period of time just prior to harvest. These histories included the name of the Pest Control Operator, the party responsible for the field, the pest the field was treated for, the pesticide applied to the field, the pesticide application rate and in most cases, the pesticide manufacturer.
2. The daily Imperial Valley Inspector Harvest Reports were examined and a chronological history recorded of the dates the fields of lettuce were harvested. These histories included the name of the harvesting contractor, the daily time and date the harvest crews entered the field and the

number of harvest crews used each day (a crew normally is composed of approximately forty (40) persons). Some fields are entered two or three times several days apart in order to harvest lettuce when the heads are of a satisfactory size.

3. The worker reentry safety intervals (where applicable) and the preharvest intervals were established using the following references:

   a. California State Worker Safety Regulations, Title 3, Section 2480.

   b. Environmental Protection Agency-Compendium of Registered Pesticides.

   c. Pesticide labeling.

Listed below are the pesticides being used most frequently in Imperial County to control the pests in the lettuce fields within 30 days of harvest (the pesticides that were used at least five (5) times in the time period on the fields in this study) and the applicable worker reentry safety intervals or preharvest intervals. Separate worker reentry safety intervals have not been set on many of the pesticides used on lettuce because the following of the preharvest interval provides adequate protection.

a. LANNATE - Seven (7) days preharvest interval through 0.45 lbs/acre-foliage application.
   Ten (10) days preharvest interval from above 0.45 through 0.9 lbs/acre-foliage application.
   Per EPA Compendium. Twenty-four hour worker reentry safety interval-supplemental labeling.

b. PHOSDRIN - Two (2) days preharvest interval through 0.5 lbs/acre-foliage application.
Four (4) days preharvest interval 0.5 lbs/acre-foliage application. Per EPA Compendium.

c. MALATHION - Seven (7) days preharvest interval 4.0 lbs/acre (Dust)-foliage application. Per EPA Compendium.

d. PERTHANE - Four (4) days through 2.0 lbs/acre (spray) or 2.5 lbs/acre (Dust)-foliage application. Per EPA Compendium.

e. DIPEL - No preharvest interval. Per EPA Compendium.

SUMMARY

A detailed study of the pesticide application histories and the work practices used on each of twenty (20) lettuce fields selected at random shows no evidence of too early reentry of fields to harvest lettuce after pesticide treatment.